REMARKS/ARGUMENTS

Claim 1 is amended to include the subject matter of Claim 6. Claim 6 is cancelled. The rejections as applied to Claim 6 are therefore now relevant to Claim 1.

Claims 1 - 7 are rejected under 35 USC 103(a) as being unpatentable over Tanabe et al in view of Makishima.

As stated by the Examiner, Tanabe et al differs from the present invention in that a concentration of oxygen dissolved in the ink is 0.1 to 2 ppm at 25°C and preferably 0.5 to 2 ppm at 25°C.

To bridge this difference, the Examiner relies on Makishima to teach an oxygen concentration less than 0.013 ml/ml (column 2 line 50-68). The Examiner reasons that the combination of teaching would be obvious "in order to have the ink with excellent ink jetting property, and which give high quality printing."

However, Makishima relates to a water-based ink which does not contain a UV-polymeric compound, and especially does not contain a radical polymeric compound. Furthermore, Makishima discloses an amount of dissolved air not an amount of dissolved

oxygen. The reason for the differences include the fact that different inks and therefore, different problems are being addressed.

Makishima teaches a technique to avoid a delay in response characteristic of a recording head caused by dissolved air in the recording head, see column 3 lines 10-15. Since the type of ink of Makishima is quite different from the present invention, one of ordinary skill could not refer to Makishima. Therefore, combining the Makishima reference is improper. Furthermore, even if referring to Makishima, Makishima does not teach an amount of dissolved oxygen and the effect to discussed, unnecessary polymerization in the adhered ink droplet.

It is therefore submitted that even if taking Tanabe and Makishima in combination, the above unnecessary polymerization in the adhered ink droplet by an amount of dissolved oxygen recited in claim 1 would not have been obvious. Furthermore, the combination itself appears to be hindsight of the impermissible type since non-analogous problems of different inks, are addressed.

Claims 1 - 7 are rejected under 35 USC 103(a) as being unpatentable over Tanabe et al in view of Noguchi (UV curing

technology for inkjet Printing- vol. 75, No.8, page 394-400).

Noguchi is being cited based on a misunderstanding of the precise nature of the disclosure. To reduce issues, enclosed herewith is an English translation of a relevant portions of the document relied by the Examiner.

Although, the Examiner states that Noguchi teaches the oxygen concentration less than 0.013 ml/ml (see page: 394-400), in fact, Noguchi absolutely teaches nothing about an oxygen concentration less than 0.013 ml/ml. Referring to the English translation, in section 5.1 Oxygen Interruption, Noguchi suggests a problem of oxygen interruption for polymerization in an ink droplet formed on a recording sheet and teaches a technique to employ a UV lamp having a high energy density to accelerate the polymerization speed.

Further, in section 5.5 Aqueous type UV inkjet ink, Noguchi merely teaches that the aqueous type UV inkjet ink refrains the oxygen interruption.

Therefore, as with Makishima, Noguchi does not teach an amount of dissolved oxygen or the effect to avoid the above unnecessary polymerization in the adhered ink droplet. Accordingly, even if the teaching in Tanabe and Noguchi is

combined, the above unnecessary polymerization in the adhered ink droplet by an amount of dissolved oxygen recited in claim 1 would not have been obvious, and therefore the solution of the problem by combining and modifying the art, would not be obvious.

Withdrawal of the rejections are therefore respectfully requested.

Respectfully submitted,

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Attachment: Translation of portions of Noguchi

English translation of relevant portions of Noguchi

5.1 Oxygen interruption

The existence of un-reacted composition on a surface of an ink due to the oxygen interruption has been carefully studied. As shown in Fig. 6, Caiger[8] teaches that an influence of an amount of dissolved oxygen and dispersion of oxygen from the outside given against UV ink having a low viscosity is larger than that given against UV ink having a high viscosity. As a countermeasure for this, there has been proposed[7] a method of increasing radical concentration with a concentration higher than a dispersing speed of oxygen from the outside by employing a UV lamp having a high energy density. Of course, as recently has been adopted with UV paint, it may be preferable to place photo-polymerization under an inactive atmosphere. Mr. Oregusa explained quantitatively a difference in initial polymerization speed between under an atmosphere of nitrogen and under an atmosphere of oxygen. Against the dispersion of oxygen from the outside, there has been pointed out the possibility that a solvent-containing type UV ink becomes more effective in a sense of delaying a dispersing speed in the vicinity of a surface of ink than a UV ink having 100% of reactive compositions. In the sense of hardening and image quality control, important subjects in an printing process involves a control of phenomenon of wettability, penetration and hardening and are as follows:

(1) Dot diameter control, image quality and hardening ability in a printing for non-absorbable substrates

(2) Wetting between a hardening ink and a non-hardening ink in a printing with a color order

(3) Penetrating and hardening in a printing for an ink absorbable material.

5.5 Aqueous type UV inkjet ink

With regard to UV inkjet ink, a study to seek an aqueous type has been increased. When a paper is printed with a UV inkjet ink containing water, it is not necessarily requested to forcibly remove water. However, some of the features of the UV inkjet ink explained above may be lost. For example, with regard to the reliability on an apparatus due to it containing volatile matter content, it becomes necessary to handle it as the same manner with the conventional inkjet ink. Gross may be lowered to the extent of the volatile matter content. Although there are features being lost like the above, on the other hand, there are advantages capable of being obtained by it.

(1) Hydrophilic property, since an aqueous type nonvolatility material is used, elements of environmental pollution becomes small.

(2) Material choice becomes wider. Especially, when a reactive material is used in a emulsion state, it becomes easy to utilize high viscosity material.

(3) Since the thickness of a solid ink layer becomes decrease, texture of an print material is not filed.

(4) It can be adaptable to a print head with high resolution.

(5) Oxygen interruption may be refrained.

(6) When it is used to print a paper, since it is possible to design an ink having a large surface tension, a dot gain becomes small and a dot shape become good.

(7) As a result, in comparison with a 100% reactive ink, its usage spreads to application for a material on which human's hand may touch, such as an indoor decoration and a general print material.

In an emulsion type aqueous UV ink, as an oligomer

material, every existing superior industrial material becomes target. Here, a stability becomes one of keys. As a difficult point in designing a soluble type aqueous UV ink, the fact that water soluble industrial materials are few, must be listed. Especially, since water-soluble photo-initiator is very limited, it is expected to design while taking a new composition within a range. By making a photo-initiator to be water-soluble, it is possible to provide a functional group having a high polarity in its molecular and a strong intermolecular force. As a result, a photo-initiator becomes such that a volatility is greatly reduced, and an influence direct to a human such as odor, evocativeness, toxic potency, biodegradability and skin evocativeness, thereby causing great merits in the aspect of environmental safety. There is an expectation for the aqueous from the above aspect.